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GRIMPOTEUTHIS BRUUNI, A NEW SPECIES OF FINNED OCTOPOD (OCTOPODA: CIRRATA) FROM THE SOUTHEASTERN PACIFIC

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ABSTRACT

Grimpoteuthis bruuni, new species, is described based upon 16 specimens captured at 250–360 m from off the coast of Chile. Their depth of capture, semigelatinous consistency and general body shape suggest a pelagic habitat in contrast to other known finned octopods.

On a recent visit to the Division of Mollusks, USNMNH, I noted a jar containing a number of semigelatinous, ovoid, finned octopods from the R/V ANTON BRUUN Chilean cruise of 1966. They appeared similar to *Opisthoteuthis medusoides* Thiele, 1915, described from the VALDIVIA expedition from off Dar-es-Salaam, Tanzania. The specimens were borrowed for study and subsequently proved to represent a new and unusual species described below.

The measurements and indices are those defined by Voss (1963, p. 11) except those of the fin length and width and the cirrus. In respect to fin measurements I have followed the usage of earlier workers, primarily Robson (1932). The length of the fin (in contrast to fin length in teuthoids) is measured from the midpoint of the base of the fin to the outer tip. Measurement of the length along either the posterior or anterior margin may yield very different figures and in forward directed fins a base point at the posterior juncture of the fin with the mantle wall may be impossible to define accurately. Fin width is the greatest width across the fin measured perpendicular to the fin length. Both of these measurements are difficult to obtain as the edges of the fins are delicate, transparent and easily damaged or distorted. The fin length index is a percentage of the interocular or head width measurement. The interocular width appears to be less variable, unless the eyes are damaged, than the mantle length, especially if the shell vestige is missing. Fin width index is expressed as a percentage of the fin length.

The cirri are reportedly subject to great shrinkage but shrinkage appears to be similar in amount to that of the mantle and does not appear to change relative measurements. Cirrus length is measured from the base of the cirrus to the tip taken from the largest cirrus observed. Cirrus length index is expressed as a percentage of the mantle length for ease of comparison with sucker diameter. This comparison is a standard character reference in cirrate octopods (Robson, 1932).

This paper is one of a series now in progress leading to a monographic revision of the finned octopods.

Grimpoteuthis bruuni new species
Figures 1–2

Material examined.—Holotype, male, mantle length 29 mm, USNM 730616. Paratypes: 11 males, mantle lengths 13–25 mm; 3 females, mantle lengths 13–19 mm, all from R/V ANTON BRUUN Sta. 717, 23°41'S, 70°34'W off Antofagasta, Chile, in 250–360 m with 18 m Gulf of Mexico semi-balloon trawl, 17 August 1966, USNM 730617. 1 male, data as above, UMML 31.1760.

Description.—The species is represented by 16 specimens, all of which have a

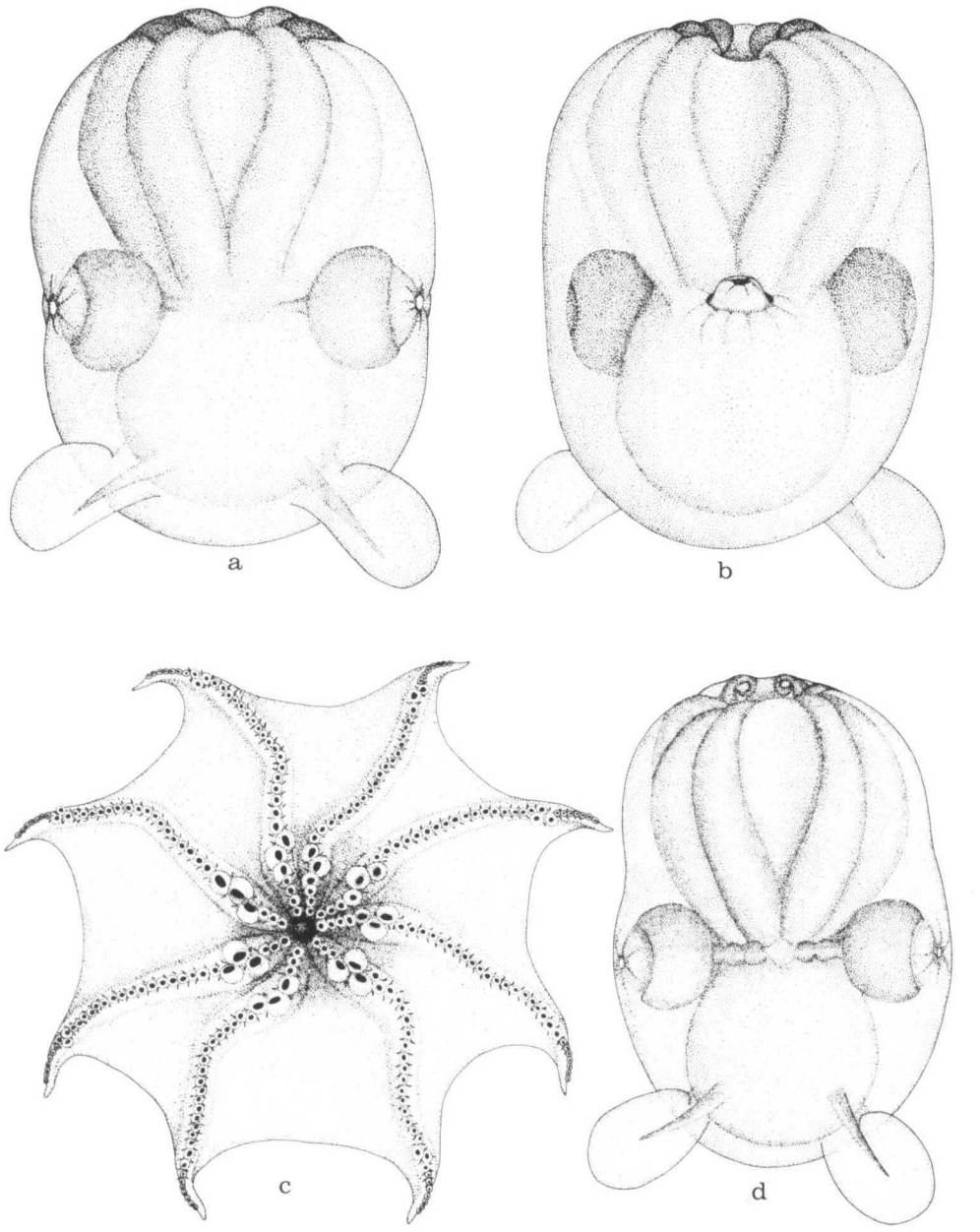

Figure 1. *Grimpoteuthis bruuni*, new species: a, Dorsal view of holotype, mantle length 29 mm; b, Ventral view of same; c, Oral view; d, Dorsal view of paratype, mantle length 13 mm.

somewhat ovoid, medusoid appearance with short, almost round bodies and medium-length arms deeply involved in the web and rolled inward toward the mouth. The latter condition may be due to preservation.

The mantle is short, rounded posteriorly, and a little wider than long. The mantle aperture is very small and closely encloses the funnel. The funnel is small

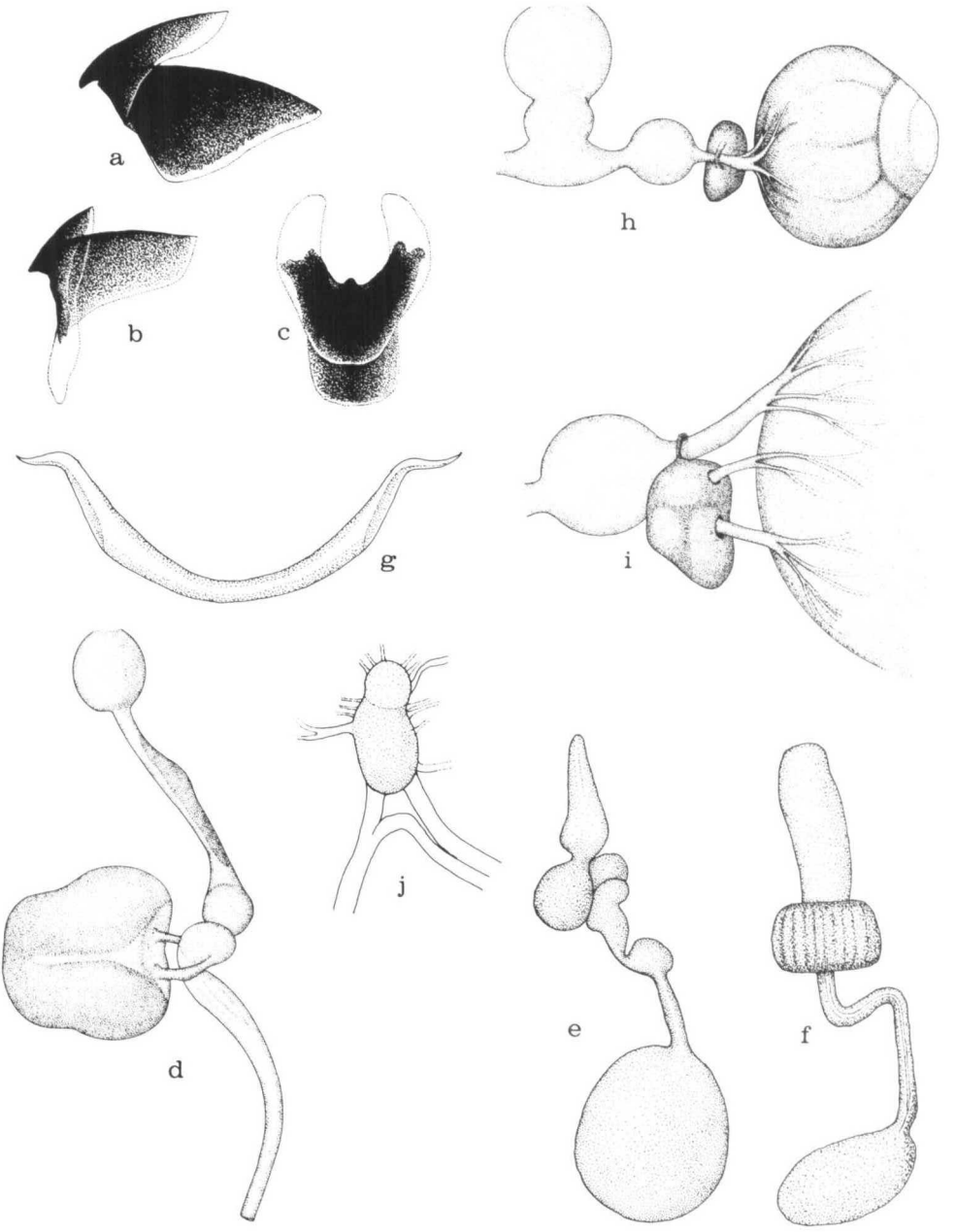

Figure 2. *Grimpoteuthis bruuni,* new species: a, Upper mandible; b, Lower mandible; c, Ventral view of lower mandible; d, Digestive tract; e, Male genitalia; f, Female genitalia; g, Shell vestige; h, Dorsal view of optic lobe, white body, and eye bulbus; i, Posterior view of same; j, Stellate ganglion.

and united to the head for its full length. The funnel organ is small and two-parted /\, the limbs thick and oval in the very young but more slender in the larger specimens.

On each side of the funnel and just within the mantle aperture is a single small

Table 1. Measurements (in mm) and counts of holotype of *Grimpoteuthis bruuni*, n. sp.

Mantle length	29.0	Sucker diameter, normal	1.0
Mantle width	38.0	Sucker diameter, enlarged	2.3
Head width	46.0	Cirrus length	0.67
Arm length I	45.0	Web depth, sector A	31
II	43.0	B	35
III	46.0	C	37
IV	46.0	D	35
Total length	73.0	E	32
Fin length	14.0	Number suckers on arm I	35
Fin width	10.0	Number of gill lamellae	6

but prominent bulbous olfactory (?) organ but no opening could be seen under the light microscope.

The fins are small, only about ⅓ or less of the interocular width and are near the posterior end of the mantle. Their length on the anterior edge is about equal to their width. The posterior margin is nearly straight, the lateral end bluntly rounded. The anterior margin is curved and has a small lobe near the anterior insertion. The muscular fin supports, easily seen through the transparent fin, are narrow and sharply pointed distally.

The head width is variable but is always greater than the mantle width. The head bears large eyes that are deeply set and protrude only slightly. The eye opening, in preservation, is very small.

The arms are moderately long and, in the largest specimens, are in the order IV.III.II.I, IV being the longest. They are all, however, about subequal and there is great variation in the young specimens. The arms are deeply involved in the web which is thick and has no consistent formula. The web encloses or borders about 90 percent of the arm length although the web depth index is lower. There appears to be a thickening on the ventral side of each arm near the web margin. This is probably the ventral lappet of other species of finned octopods but it is obscured here by the thickness of the web. The web extends further distad on the dorsal side of each arm than on the ventral side.

The suckers are in a single row. There are about 27 to 35 suckers on arms I and II, the number increasing with the size of the animals. The suckers in the males are arranged in a definite order of size. There is a single row of small suckers basally around the mouth. The following two to three suckers increase in size, the apertures slightly projecting above the oral surface of the arms, but the body of the suckers becomes bulbous and deeply set into the semigelatinous tissue. These are followed by three comparatively gigantic suckers, the sucker body round and greatly inflated with the enlarged apertures barely raised above the arm surface, the sucker itself deeply buried in the tissue. Distal of the last large sucker the others become small again until about the 17th sucker near the web margin where about three to four suckers are again somewhat enlarged. Distal of these enlarged suckers are about 7–8 small suckers gradually decreasing in size to the tip of the arm. The same general arrangement is found on all of the arms.

Even in the smallest males of a mantle length of 13 mm the 3–4 proximal enlarged suckers are easily seen but the suckers at the margin of the web are not enlarged until in specimens of a mantle length between 18 to 23 mm or greater.

In the females there are no enlarged suckers and they show the typical gradual increase and decrease in size. In these, the proximal suckers are largest but not

Table 2. Indices of bodily proportions and counts of 13 males of *Grimpoteuthis bruuni*, n. sp.

Number	1	4	5	6	8	9	10	11	12	13	14	15	Holotype 16
Mantle length	13	15	15	17	20	20	21	22	23	25	—	25	29
Mantle width Index	119.2	120.0	120.0	105.8	145.0	125.0	109.5	131.8	121.7	120.0	—	108.0	131.0
Head width Index	138.5	133.3	133.3	135.3	160.0	145.0	138.1	140.9	147.8	144.0	—	140.0	158.6
Fin length Index	30.0	26.0	—	36.9	31.3	36.2	34.5	29.0	29.4	30.6	—	31.4	30.4
Fin width Index	79.6	105.7	—	58.8	75.0	61.9	65.0	86.7	78.0	63.6	—	68.2	71.4
Arm length Index	42.6	—	—	54.3	46.9	59.1	54.2	59.2	58.8	56.7	—	61.0	63.0
Mantle arm Index	113.0	100.0	—	89.5	86.9	76.9	80.7	75.9	76.7	84.8	—	69.4	63.0
Web depth Index	78.3	73.3	—	—	86.9	84.6	73.1	79.3	70.0	79.7	—	77.8	80.4
Sucker Index (normal)	3.8	3.9	—	3.4	3.4	2.9	4.8	2.7	3.3	3.0	—	2.7	3.5
Sucker Index (large)	5.0	5.3	—	5.9	6.3	7.1	7.4	5.3	4.7	5.0	—	6.0	7.9
Suckers on arm I	28	29	—	28	32	32	31	30	33	32	—	32	35
Cirrus length Index	1.9	—	—	—	—	—	—	1.9	1.5	1.7	—	2.0	2.3
Number gill lamellae	6	6	6	6	6	6	6	6	6	6	6	6	6

Table 3. Indices of bodily proportions and counts of three females of *Grimpoteuthis bruuni*, n. sp.

Number	2	3	7
Mantle length	13	13	19
Mantle width Index	107.7	138.5	110.5
Head width Index	134.6	176.9	126.3
Fin length Index	28.6	34.8	22.9
Fin width Index	90.0	—	90.9
Arm length Index	—	—	—
Mantle arm Index	92.7	92.9	100.0
Web depth Index	85.7	92.9	78.9
Sucker Index (normal)	3.9	3.9	3.1
Sucker Index (large)	—	—	—
Suckers on arm I	27	32	30
Cirrus length Index	—	—	1.3
Number gill lamellae	6	6	6

abruptly so and are only slightly larger. Beyond these the suckers gradually decrease in size to the tip of the arm. Unfortunately, the females are all small and it is impossible to determine if the web-margin suckers increase in size with added growth. The suckers of the females are more regular and slightly more protuberant than in the males.

There is a single row of small cirri on each side of the sucker row, alternating with the suckers. The cirri are very small and never attain a length equal to the diameter of the largest normal suckers.

The shell vestige is small, broadly U-shaped and angled posteriorly, flared at the limbs, and tapered to fine outward-turned points. The fin muscle insertion is well marked.

The gills are of the "half orange" type and each contains six large lamellae.

The digestive tract was dissected from one specimen. The buccal mass is relatively small. The beaks show no particular features except for a slight depression or groove on the lamella of the upper beak. There is no radula. There are no posterior salivary glands. The esophagus is stout and leads into a slightly swollen section that might be interpreted as a crop. This leads directly into a small stomach and spiral caecum of equal size. The digestive gland is large, somewhat squarish, with well demarcated digestive ducts appendage. The digestive gland is connected to the spiral caecum by the usual two ducts between which passes the undifferentiated intestine. There is no ink sac and there are no anal flaps.

All but three of the specimens are males. The male genitalia were dissected from one specimen and are illustrated (Fig. 2e). They correspond rather well with Ebersbach's fig. 17 (1915, p. 407) of the male organs of *Grimpoteuthis umbellata*. The females are all small but the gonads were removed from the largest specimen and are illustrated (Fig. 2f). They differ from others in the more massive distal oviduct. As in all cirrate octopods, the gonads are unpaired and found on the left side. None of the specimens, male or female, appeared to be sexually mature.

The eyes were dissected to observe the optic lobe and white body. The optic lobe is comparatively large and round, located about half way from the brain to the base of the eye. The white body is dark violet gray through which nerves from the optic lobe pass to the eye.

The stellate ganglion was also exposed. The ganglion is long and cigar-shaped, round in cross section, with numerous nerve strands leading from it. The ganglion itself is yellowish in distinct contrast to the nerves leading to it and away from it.

There is no sculpture and the body is entirely smooth except for the wrinkles of preservation. The body musculature is very poorly developed and the mass of the mantle, head and arms is of a somewhat gelatinous consistency. The color is a clear reddish brown without any discernible pigmentation except on the viscera where the liver and the esophagus have a deep purplish covering.

Holotype.—A male, mantle length 29 mm, fixed in formalin and preserved in alcohol. USNM 730616.

Type locality.—23°41'S, 70°34'W off Antofagasta, Chile, in 250–360 m.

Discussion.—This species does not appear to be closely related to any of the finned octopods in the Indo-Pacific. While it has a superficial resemblance to *Opisthoteuthis medusoides* Thiele, 1915, from off Dar-es-Salaam, it varies from that species, as it is now known, by its shorter cirri, more posterior placement of the fins, more paddle-shaped fins, and different arrangement of the suckers. But it is not an *Opisthoteuthis* (if *medusoides* even belongs in that genus) and is clearly a species of *Grimpoteuthis* as now defined. In the Atlantic it is closest to *Grimpoteuthis grimaldi* (Joubin, 1903) which also has a somewhat similar appearance, short cirri, somewhat similar sucker arrangement, and small posterior fins. It differs from *grimaldi* in the number of enlarged suckers both near the mouth and near the web margin, the smaller number of gill lamellae, more slender shell vestige, and the lack of pigmentation. It would be interesting to compare these specimens with those of Massy (1916, p. 186) from the western Indian Ocean which she ascribed to *G. grimaldi*. Unfortunately, the description and illustrations of this latter species are insufficient for comparison with others. I have examined the type of *grimaldi* at Monaco and found a number of discrepancies between the specimen and the descriptions by Joubin (1903, p. 100 and 1920, p. 16). A full redescription of *G. grimaldi* based upon a series containing various growth stages is now in preparation.

In summary, this appears to be a new, distinctive species. Its appearance suggests a midwater habitat but extensive trawling experience leads me to believe that most of the finned octopods dwell on or very near the bottom and that none or few are pelagic. This opinion is supported by the observations of Roper and Brundage (1972) based upon bottom photographs of cirrate octopods. The present species may be an exception, although the specimens were taken in a bottom trawl.

The specific name *bruuni* is in honor of the late Anton Bruun noted Danish deep-sea biologist and valued friend, for whom the research vessel ANTON BRUUN was named.

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